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UNITED STATES ARMY AVIATION TEST BOARD
Fort Rucker, Alabama 36362

STEBG-TD 27 MAR 1964

SUBJECT: Report of Test, USATECOM Project Number 4-4-6500-04, (6) "Military Potential Test of the Sioux Scout"

(11) 27 Mar 64 (12) 25p.

TO: Commanding General
US Army Test and Evaluation Command
ATTN: AMSTE-BG
Aberdeen Proving Ground, Maryland 21005

(14) USATECOM-4-4-6500-04

AD A030837

1. References. A list of references is attached as inclosure 4.

2. Authority.

a. Directive. Unclassified Message TT488, Commanding General, US Army Test and Evaluation Command, 10 January 1964, as amended by Unclassified Message TT598, Commanding General, US Army Test and Evaluation Command, 14 January 1964.

b. Purpose. To determine the characteristics and the potential of the design features of the Sioux Scout as applicable to weapon helicopters.

3. Background.

a. A stated requirement does not presently exist for this particular type helicopter.

b. The manufacturer's representatives stated, "The primary purpose of the Sioux Scout is to determine the feasibility of tandem seating, rotor unloading by the stub wing, grouping of cyclic and anti-torque functions in one control, and general improvements in speed and stability by cleaning up the fuselage and other exposed surfaces." The manufacturer's handbook states that, in the basic configuration, "The Sioux Scout may be employed for observation, tactical escort and

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protection, reconnaissance, destruction of enemy aircraft, adjustment of artillery fire, tactical air coordination, limited suppressive fire against lightly defended targets and commanders tactical scout vehicle. Alternate configurations permit installation of external cargo, fuel, and air-to-ground rockets."

c. The Sioux Scout was certified "Experimental" by the Federal Aviation Agency. Insurance requirements of the Bell Helicopter Corporation required the pilot or copilot-gunner seat to be occupied by a manufacturer's representative when the helicopter was airborne.

d. The Bell Helicopter Corporation provided, at no expense to the US Army, the Sioux Scout for military potential evaluation from 6 January 1964 through 31 January 1964. Qualified flight and maintenance personnel were made available by the Bell Helicopter Corporation to provide assistance in the operation and maintenance of the helicopter. An armament technician to assist in operation and maintenance of the weapon subsystem was provided by Emerson Electric of St. Louis, Missouri.

e. The 11th Air Assault Division (AAD) programmed an air assault concept evaluation of the Sioux Scout during which the US Army Aviation Test Board (USAAVNTBD) was directed to conduct a military potential test.

f. The test item was delivered to the 11th AAD on 8 January 1964.

4. Description of Materiel. The Sioux Scout, which is fabricated primarily from proven components of the OH-13S Helicopter, is an armed helicopter in the observation weight class. It differs primarily from other helicopters of like type in the incorporation of the following "new design" features:

a. Tandem seating

b. "Side arm" controls for the copilot-gunner

c. Stub wings

d. Chin turret

A detailed description of the helicopter is attached as inclosure 1.

5. Test Objectives.

a. To determine the tactical suitability and operational, training, safety, and maintenance characteristics of the Sioux Scout helicopter design features by limited testing under field conditions.

b. To determine qualitatively the military potential of the Sioux Scout design features based upon test results and the background and experience of project personnel.

6. Test Data. Test data and information furnished by the manufacturer are attached as inclosure 2.

7. Scope.

a. A joint test (36 flight hours) was conducted, consisting of a concept evaluation by the 11th AAD, Fort Benning, Georgia, and a military potential test by the USAAVNTBD, Fort Rucker, Alabama. The method and scope of the overall evaluation were determined by the 11th AAD. Limited testing under field conditions at Fort Stewart, Georgia, was conducted by both agencies from 12 January through 16 January 1964. The results of the military potential test were compared against the suitability for operation in the Army environment since approved Military Characteristics (MC's) have not been published by Department of the Army. The results were also evaluated against the background and experience of project personnel.

b. Evaluation of the weapon subsystem was performed at Fort Stewart and Fort Rucker. During the conduct of the evaluation at Fort Rucker, 10,080 rounds of 7.62mm ammunition were fired. Stoppage and malfunction data are contained in paragraphs B3b(4) and (5) of inclosure 2.

8. Findings.

a. Physical Characteristics. The overall physical characteristics of the Sioux Scout helicopter were satisfactory for operation in the test environment. Deficiencies and shortcomings noted during test and suggested corrective action are contained in paragraph C of inclosure 2.

b. Operational Characteristics. Hover and flight characteristics of the Sioux Scout were found to be excellent.

c. Tactical Suitability.

(1) The Sioux Scout was determined to be capable of engaging lightly defended ground targets with limited suppressive fire, and possessed a limited point target capability.

(2) The Sioux Scout did not possess sufficient armament to be suitable as an armed escort helicopter.

d. Training Requirements.

(1) Minimal additional training was required for helicopter qualified personnel.

(2) Copilot-gunner training requirements varied with the skill level of test personnel.

e. Safety Considerations. Aviation safety characteristics, both flight and ground, were adequate.

f. Maintenance Characteristics.

(1) The use of proven helicopter components eliminated any unusual maintenance characteristics.

(2) Maintenance training approximated that of observation helicopters.

g. Military Potential of New Design Features.

(1) The tandem seating configuration reduced drag and greatly increased all-around visibility at both pilot and copilot-gunner stations over that of side-by-side seating. Elevation of the pilot's station allowed him to monitor weapons firing conducted by the copilot-gunner and provided sufficient visibility for nap-of-the-earth operation.

(2) The incorporation of the cyclic and antitorque functions into one "side arm" control at the right side of copilot-gunner station cleared the center cockpit, permitting convenient stowage of the weapon sight without obstructing visibility. The left "side arm" control was a conventional collective pitch and throttle. The "side arm" controls provided satisfactory flight response in all attitudes. The "side arm" controls were particularly comfortable on flights of extended duration.

(3) The stub wings were mounted at appreciable incidence and contributed to the stability of the helicopter.

(a) This stability was particularly noticeable in steep turns at high airspeeds. These maneuvers were accomplished without a noticeable loss of airspeed or altitude at a constant power setting. The Sioux Scout had a "solid" feeling of stability in steep turns without the buffeting, pitching, or rolling normally associated with helicopters in this weight category.

(b) During autorotation the stub wings permitted operation at reduced airspeed and rate of descent without a loss of rotor r.p.m.

(c) Faster forward speeds could be attained in this helicopter than in the OH-13S Helicopter powered by a TVO-435 engine at the same gross weights and power settings; the increased airspeed resulted in approximately 35 percent greater range. This is attributed by the manufacturer to reduced drag and frontal area and to the unloading of the main rotor by the stub wings.

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9. Conclusions. The "new design" features of the Sioux Scout (paragraph 4) provided significant advantages in performance and tactical suitability over current Army weapon helicopters.

10. Recommendations. It is recommended that the "new design" features be considered for incorporation in future Army weapon helicopters.

Russell P. Bruns Col Arty
for A. J. RANKIN
Colonel, Armor
President

4 Incl
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3. Army "T" configuration

DESCRIPTION OF MATERIEL

1. The Sioux Scout is an armed helicopter in the observation weight class. It is fabricated primarily from proven components of the OH-13S Helicopter. Design features are stub wings, tandem seating, modified mid-frame, fiber glass cowling and fairing, and a semi-monocoque tail boom. Power is supplied by a Lycoming TVO-435-B1A reciprocating engine (270 hp.) with an Air Research exhaust-driven super-charger. The Sioux Scout utilizes the standard OH-13S transmission and rotor system with installed blade tip weights in both main and tail rotors. Fuel is contained in tanks located in shoulder-mounted stub wings. Landing gear is the conventional skid type which is fiber glass faired to reduce drag.

2. The cockpit is divided into pilot and copilot-gunner stations. Tandem seating is utilized with the pilot to the rear of and on a higher level than the copilot-gunner. Entrance to the pilot's station is from a folding right side canopy. The forward plexiglass nose opens forward and left for entrance to the copilot-gunner station. The helicopter may be flown by the pilot using conventional controls or by the copilot-gunner using a conventional collective and a "side-arm" type control incorporating cyclic and antitorque functions. A baggage compartment is provided to the rear of the engine compartment on the left side and has a capacity of eighty pounds, provided the copilot-gunner's seat is occupied.

3. The helicopter has two separate hydraulic systems: primary, which is used for flight controls only; and secondary, which controls the movement of the armament turret and may be used for flight controls in an emergency.

4. The twin M60C 7.62mm machine-gun turret system consists of a turret mounting two M60C machine guns, a sighting station, and a master control panel. The system is capable of delivering a total combined firepower of approximately 1200 rounds per minute while slewing at rates of 65 degrees per second in elevation and 85 degrees per second in azimuth. Recoil force imposed by the guns on the turret mount is 430 pounds for both guns and 255 pounds for one gun. Slew rate and recoil force are quoted from the manufacturer's brochure.

a. The turret is mounted on the under side of the helicopter beneath the copilot-gunner position and is 24 inches in diameter. The rear half of the turret contains two curved ammunition boxes which hold a maximum of 550 rounds each of 7.62mm linked ammunition. The

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front half of the turret encloses the two M60C machine guns and the internal working parts of the turret. The guns extend from the front of the turret through a fairing extension and are elevated through vertical slots provided in the front of the fairing extension. The entire lower portion of the turret rotates in azimuth 100 degrees to either side of the centerline of the turret. The turret design is such that the relative positions of the guns, ammunition boxes, and feed mechanism are always the same with respect to each other. Elevation travel is restricted by the dimensions of the turret. Chuting has been eliminated in this system and a variable speed boost motor feeds ammunition from the boxes to the guns on a demand basis.

b. The Emerson Electric sight station is similar to that used with the M-6 subsystem. The sight station has been modified to adapt to the Sioux Scout cockpit. The sight is located at the copilot-gunner position and is mounted on the floor where it stows conveniently when not in use. A further modification has eliminated the pistol grip handle on the sight and substituted two hand grips, each with a trigger and "deadman" switch. Actuation of both "deadman" switches and either trigger will fire either or both guns, depending on which gun is armed.

c. The control panel is mounted on top of the pilot's instrument console for his use but may be operated by the copilot-gunner. The panel contains a master switch for the weapons system. The master switch is a two-position switch and does not provide an "ON but SAFE" position. The guns are "SAFE" only when the copilot-gunner manually pulls the bolts to the rear and holds them there by means of two cable and hook arrangements, one on each side of the copilot-gunner seat. Pulling the cables to the rear and releasing them is the only means of arming the guns.

d. The turret is operated hydraulically as commands are sent electrically by the sighting station. The turret hydraulic system is independent from the helicopter hydraulic system and provides an emergency boost for flight controls. The weapons system can be operated on battery power alone, if necessary, but this is not recommended due to high power requirements. Hydraulic power requirements are one gallon per minute at 1500 p.s.i., and electric power for slewing and firing requires 14 amperes at 28 volts d.c. according to the manufacturer's brochure. The manufacturer's representative stated that the hydraulic pressure in the weapon system was set for 800-1000 p.s.i. It is assumed that this lower setting is to make the system compatible with the helicopter system in the event emergency flight boost is necessary.

5. Attaching points are present under each stub wing for external pods. Presently fabricated pods carry two five-gallon cans of fuel under each wing to extend range. The helicopter must be landed and shut down and the fuel transferred manually.

6. The following weights and dimensions were obtained from the manufacturer:

a. Airframe Dimensions.

Length	Maximum, main rotors aligned with fuselage	47 ft. 7 1/4 in.
	Main rotors perpendicular to fuselage	34 ft. 1 3/4 in.
Width	Maximum, main rotor aligned with fuselage	11 ft. 2 in.
	Landing gear tread	6 ft. 3 in.
Height	Maximum, main rotor tip	12 ft. 6 in.
	Minimum, main rotor tip	7 ft. 7 1/2 in.
	Tail rotor minimum ground clearance	3 ft. 2 in.
	Main rotor diameter	37 ft. 1 1/2 in.
	Tail rotor diameter	5 ft. 10 1/8 in.

b. Weights.

Basic weight (includes weight of guns and sight)	2203 pounds
Operating weight	
Basic weight	2203 pounds
Fuel	258 pounds
Oil	32 pounds
Crew	400 pounds

Ammunition (1100 rounds of 7.62mm)	70 pounds
otal operating weight	2963 pounds
aximum recommended gross weight	3000 pounds
eapons subsystem:	
Turret assembly	68 pounds
Control panel	5 pounds
Sight station	10 pounds
Two M60C guns	42 pounds
otal (included in basic weight of elicopter)	125 pounds

b. Flight Characteristics and Performance.

(1) Effectiveness and Responsiveness of Flight Controls, Both Pilot and Copilot-Gunner. The flight controls were evaluated from both flight stations and were deemed satisfactory. At the copilot-gunner station the initial transition from forward to hovering flight was critical. After approximately fifteen minutes of flight familiarization, further difficulties were not encountered. The pilot's flight controls were standard and required no familiarization. The right "side arm" control for the copilot-gunner incorporated the functions of cyclic and antitorque controls; the left "side arm" control was a conventional collective pitch and throttle.

(2) Capability for Running Landings and Takeoffs and Slope Landings. Running landings and takeoffs were performed with the Sioux Scout using conventional techniques for helicopters. Appreciable further training was not required for aviators currently qualified in helicopters. Slope landings were performed on slopes of five and ten degrees. Characteristics and techniques were normal in this helicopter although the landing gear tread has been narrowed over similar types.. Technique using the forward "side arm" controls required approximately fifteen minutes' familiarization.

(3) Autorotative Characteristics. The Sioux Scout was autorotated at various gross weights. All autorotations were terminated in power recovery due to manufacturer's insurance requirements. Entry and termination were normal without unusual forces or attitudes evident from either the pilot's or copilot-gunner's station. The helicopter was aerodynamically clean and accelerated rapidly from the 60 m.p.h. normal autorotative airspeed by lowering the nose. An increase in airspeed or a steep flare did not result in the rotor r.p.m. exceeding the red line as commonly characteristic with higher speed helicopters equipped with high inertia rotors. The manufacturer states this is due to the action of the stub wings. Low rotor r.p.m. may be increased by normal recovery maneuvers. The autorotative glide ratio was noticeably increased over a comparable machine (OH-13S) particularly during the interval from the entry at cruise airspeed to an airspeed of 60 m.p.h. Decay of rotor r.p.m. was not evident in turns, slow airspeeds, or flares.

(4) Stability. Flight stability was satisfactory in all maneuvers. Particularly noticeable was the lack of pitching, rolling, or buffeting when entering high speed turns, ascents, descents

or combinations thereof. Vibrations encountered in flight maneuvers were mild. Vibrations build slightly when rolling out of turns at 125 m.p.h. (Vne) and 60 degrees bank. Stability at a hover was extremely good for a helicopter of this type. Stability was evaluated from both the pilot and copilot-gunner stations.

(5) Cruise Speed. The manufacturer's representative and flight handbook recommended power settings of 27.5 inches manifold pressure and 3150 r.p.m. which gave an indicated airspeed (IAS) of 110 m.p.h. True airspeed (TAS) at this power setting was 107 m.p.h. during the test. Installation of the external pods did not appreciably affect helicopter cruise speed.

(6) Endurance at Normal Cruise Speed.

(a) Endurance at power settings of 27.5 inches manifold pressure and 3150 r.p.m. was computed as two hours and thirty minutes, based on 43 gallons of usable fuel (115/145 performance number). Endurance was confirmed by test.

(b) The Sioux Scout's range was approximately 35 percent greater than that of the OH-13S Helicopter at the same gross weights and power settings. This was a result of higher airspeeds. Range can be increased by use of two external pods, attached one under each stub wing. Each pod contains ten gallons of fuel in five-gallon cans and sufficient lubricants to support the extended range. The helicopter must be landed and shut down, and the fuel transferred manually. Utilization of full main tanks and the external pods increases endurance to three hours fifty minutes.

(7) Dash Speed. The Sioux Scout quickly attained a dash speed of 125 m.p.h. IAS. Power settings necessary to maintain this dash speed were 29 inches manifold pressure and 3200 r.p.m. at a pressure altitude of one thousand feet and a density altitude of minus four hundred feet. No attempt to exceed this speed (125 m.p.h.) was made due to the manufacturer's placarding the helicopter at this Vne. Maximum continuous power rating of the engine is not required to attain or maintain dash speed.

(8) Payload. The Sioux Scout Helicopter was evaluated at the maximum gross weight of three thousand pounds. Flown at Vne of 125 m.p.h., with and without external pods, no unusual flight characteristics were noted at maximum gross weight.

(9) Center-of-Gravity Range. The center-of-gravity limits are stations 132.2 forward and 137.6 after. Critical limits were encountered when the copilot-gunner station was unoccupied. When the copilot-gunner station was unoccupied, all cargo or ballast had to be carried in either the external pods or copilot-gunner's station. This information was extracted from the manufacturer's handbook; the Sioux Scout was not evaluated in this configuration.

c. Night and Instrument Flight Characteristics.

(1) Night Flight Characteristics. The Sioux Scout was evaluated for two and one-half hours at night. Evaluation was made from both the pilot and copilot-gunner stations.

(a) Standard navigational lights were provided right, left, and rear. Instrument lighting was provided at the pilot's station only. A controllable searchlight or landing light was not installed.

(b) Flight from the pilot's station was similar to that of other helicopters of like type. The pilot's instrument console had sufficient instrumentation so that a visible horizon was not required for safe flight. The copilot-gunner station required a visible horizon and lighting of flight instruments for safe night flight. Installation of a hood over the pilot's console reduced lighting glare to an acceptable level. Minor reduction of the pilot's forward visibility resulted from the hood. Outside lights were reflected in all directions within the plexiglass canopy. The rotating beacon (Grimes light) caused a reflection of the rotor and stabilizer bar in the lower section of the nose canopy which could induce "flicker vertigo" at the copilot-gunner station.

(2) Instrument Flight Capability. The Sioux Scout was flown by reference to instruments from the pilot's station. Only basic instrument flight maneuvers were performed. Instrument flight was simulated by use of a hood provided by the manufacturer. Navigational radios were not installed (see paragraph a(2) above). The helicopter was satisfactory for instrument flight; however, improvement would be made with a larger artificial horizon presentation and a directional gyro presentation less susceptible to precession (10 degrees per 10 minutes on each flight with instrument currently installed).

2. New Design Features.

a. Tandem Seating. Tandem seating of the pilot and copilot-gunner increased all-around visibility and reduced flat plate area and drag.

(1) Pilot. Elevation of the pilot's station permitted him to monitor weapons firing or flight performed by the copilot-gunner. Additionally, visibility from the pilot's station permitted him to fly within the nap of the earth.

(2) Copilot-Gunner. The copilot-gunner's station was forward and low. The copilot-gunner had unrestricted forward and side visibility. The copilot-gunner had rear visibility of approximately 150 degrees by moving his head only. If he turned his body, the limit to rear visibility was only that portion blocked by the helicopter fuselage. A rearview mirror was provided at the copilot-gunner station and enabled monitoring of the pilot without body turning by the copilot-gunner.

b. "Side Arm" Controls. The incorporation of the cyclic and antitorque functions into one "side arm" control at the right side of copilot-gunner station cleared the center cockpit, permitting convenient stowage of the weapons sight without obstructing visibility. The left "side arm" control was a conventional collective pitch and throttle. The "side arm" controls provided satisfactory flight response in flight and at a hover. The "side arm" controls were particularly comfortable on flights of extended duration.

c. Stub Wings.

(1) The stub wings were mounted at appreciable incidence and contributed to the stability of the helicopter.

(a) This stability was particularly noticeable in steep turns at high airspeeds. These maneuvers were accomplished without a noticeable loss of airspeed or altitude at a constant power setting. The Sioux Scout had a "solid" feeling of stability in steep turns without the buffeting, pitching, or rolling normally associated with this type helicopter when performing these maneuvers.

(b) During autorotation the stub wings permitted operation at reduced airspeed and rate of descent without a loss of rotor r.p.m.

(c) Faster forward speeds could be attained in this helicopter than in the OH-13S Helicopter at the same gross weights and power settings; the increased airspeed resulted in approximately 35 percent greater range. This is attributed by the manufacturer to the unloading of the main rotor by the stub wings.

(2) The use of the stub wings as fuel cells allowed fuel weight to be distributed about the helicopter's center of gravity and was an excellent use of available space.

3. <u>Armament.</u>

a. <u>Physical Characteristics.</u> Owing to the limited nature of this test, weights and dimensions provided by the manufacturer (see inclosure 1) were not verified.

b. <u>Operational Characteristics.</u>

(1) <u>Flexible Fire Capability for Copilot-Gunner and Fixed Forward Fire Capability for the Pilot.</u>

(a) The weapon subsystem possessed a flexible-fire capability for the copilot-gunner but did not have a fixed-fire capability from either crew position. The chin turret traversed 100 degrees to either side of the centerline of the turret mount, elevated to +15 degrees, and depressed to -45 degrees. The sighting station was basically the one used with the M-6 subsystem except for modifications to provide for mounting the sight on the floor in front of the copilot-gunner. The sight arrangement was easy to use and its flexibility allowed the gunner to follow a target to extreme angles of traverse without moving his body.

(b) A sight and a firing switch for the pilot's station was not installed nor required in the present configuration. Provisions for the pilot to fire from the stow position are required and could be incorporated simply by making the necessary wiring changes. Capability of firing from the pilot's station would require some form of sighting device.

(2) <u>Effectiveness of Fire in All Helicopter Attitudes.</u> The weapon system was fired from all normal helicopter attitudes from hovering flight to high speed flight. Effectiveness of fire was found to be satisfactory. The elevation range of the guns was sufficient

to permit target acquisition at long range (500 meters) even in a very nose low takeoff attitude. In a steep bank where elevation becomes deflection, there was a loss of effectiveness to the rear on the outside of the turn. This is normal on all flexible systems presently installed on Army helicopters. The lower chin turret subsystem permitted a specific target to be engaged for a greater length of time than was possible with any of the standard side-mounted subsystems.

(3) Effect of Fire on Helicopter Stability. There were no undesirable effects noted on helicopter stability while firing to the front or side at a hover and from various airspeeds up to 120 m.p.h.

(4) Reliability. Reliability of the weapons system was satisfactory. Data collected from firing at Fort Rucker indicated that stoppages were primarily caused by malfunctions of the guns due to faulty bolts (failures to extract or eject). The bolt on the right gun was replaced twice during the firing test. Although only a limited test was performed on the weapons subsystem, it is believed that proper maintenance (cleaning and inspection after each two thousand rounds of firing) would virtually eliminate stoppages of this system. As far as could be determined, none of the stoppages resulted from malfunction of the feed system.

(5) Stoppage Data.

Gun Location	No. of Rds. Fired	Stoppages
Left	5,120	2
Right	4,960	6
TOTALS	10,080	8

The table does not include two stoppages resulting from human error in loading the system.

(6) Gas Contamination. Fumes from fuel or ammunition expenditure were not noticeable in the cockpit during the test.

c. Provisions for Interchangeability of Weapons. Interchangeability of weapon subsystems does not appear to be feasible with the present Sioux Scout configuration. The manufacturer's representative stated that there are no "hard points" for mounting

weapons other than the chin turret. The stub wing will carry light loads on the attaching points provided, but was not specifically designed to do so. Disregarding structural considerations, it is not practical to fire weapons mounted there due to the proximity of the main rotor blade. The 40mm grenade launcher could be mounted on the Sioux Scout by redesigning the turret; however, it is not known if the airframe is stressed for the recoil forces of the 40mm grenade launcher system. In addition, the extent that modifications would have to be made to the electrical and hydraulic systems of the helicopter and how these would affect the gross weight and center of gravity of the helicopter is not known. The manufacturer's weight and balance figures on the present Sioux Scout configuration indicate the Sioux Scout will not carry the additional weight of the 40mm grenade launcher with a reasonable ammunition load without an increase in recommended maximum gross weight.

d. Sight Compatibility with Other Systems. No provisions were made for interchangeability of weapons systems; however, it was observed that the sighting station was basically the one utilized with the M-6 Quad M60C Subsystem.

e. Ease of Maintenance and Reloading.

(1) Maintenance was performed by the manufacturer's representatives and did not prove to be a major problem. The design of the turret provides very little working space for correcting stoppages.

(2) Loading the system (placing full ammunition boxes inside the turret and connecting them to the guns) required approximately 10 minutes. This time was considered excessive for the amount of ammunition involved and was a result of the means by which the ammunition boxes were held inside the turret. The ammunition boxes, although complete and separate items, had to be mated with each other in order to be locked inside the turret. Two men installed the guns and loaded the system in approximately 15 minutes.

C. Deficiencies, Shortcomings, and Suggested Corrective Action.

1. The following deficiencies were noted during the evaluation:

Deficiency	Suggested Corrective Action
a. Copilot-gunner flight instruments were not lighted.	Install standard instrument lighting.

Deficiency	Suggested Corrective Action
b. Fouling of weapons barrels could occur when aircraft was on ground.	Install a limit strap on copilot-gunner's sight.
c. No provisions were made for fixed-fire capability or sighting from pilot position.	Install a pilot's firing switch and sighting device in accordance with MIL-STD-203, 250B.
d. Controllable searchlight or landing light was not provided.	Install a landing light and/or searchlight in accordance with MIL-STD-250B.
e. Weapon subsystem could be armed only by the copilot-gunner.	Modify existing armament subsystem to provide arming by the pilot and copilot-gunner.

2. The following shortcomings were noted during the evaluation:

Shortcoming	Suggested Corrective Action
a. Primary flight instruments were displaced from center of console.	Relocate instruments to console center.
b. Copilot-gunner did not have access to communications and tactical radio frequency selector.	Provide frequency selector at copilot-gunner station.
c. Adjustment of pilot's seat and antitorque pedals was insufficient.	Provide greater travel or adjustment.
d. Homing antennas for tactical radio not installed.	Install antennas.
e. Location of the rotor brake was not in accordance with military standards.	Relocate in accordance with MIL-STD-250B to pilot's left, adjacent to power quadrant.
f. Map stowage compartment was not provided.	Provide map stowage compartment in accordance with MIL-STD-250B.

Shortcoming	Suggested Corrective Action
g. Shoulder harness was not equipped with an inertia reel lock.	Install an inertia reel that contains a locking device and locate in accordance with MIL-STD-250B.
h. Design of turret was such that maintenance, trouble shooting, and loading are difficult.	Redesign turret to provide for easier access to system and easier method of installing ammunition boxes.
i. The airspeed indicator was calibrated in miles per hour.	Provide an airspeed indicator calibrated in knots to be consistent with general Army usage.

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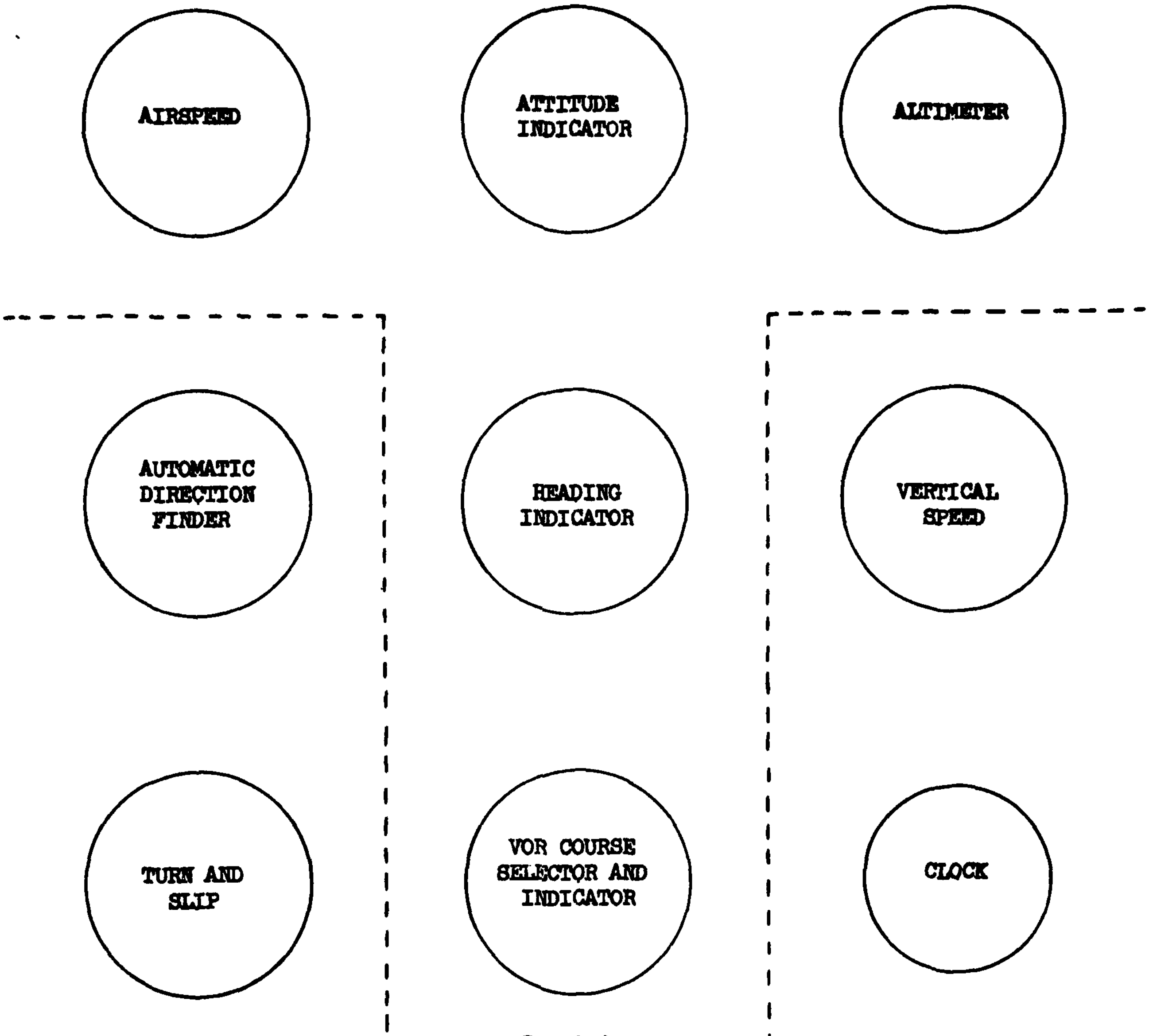

Optimum Panel Arrangement
of Instruments Currently
Standard in the Army

(Dotted line indicates basic "T," not to be painted on panel)

This drawing is taken from USAAVNTBD report of test, Project No. AVN 1557, 31 December 1958.

Inclosure 3

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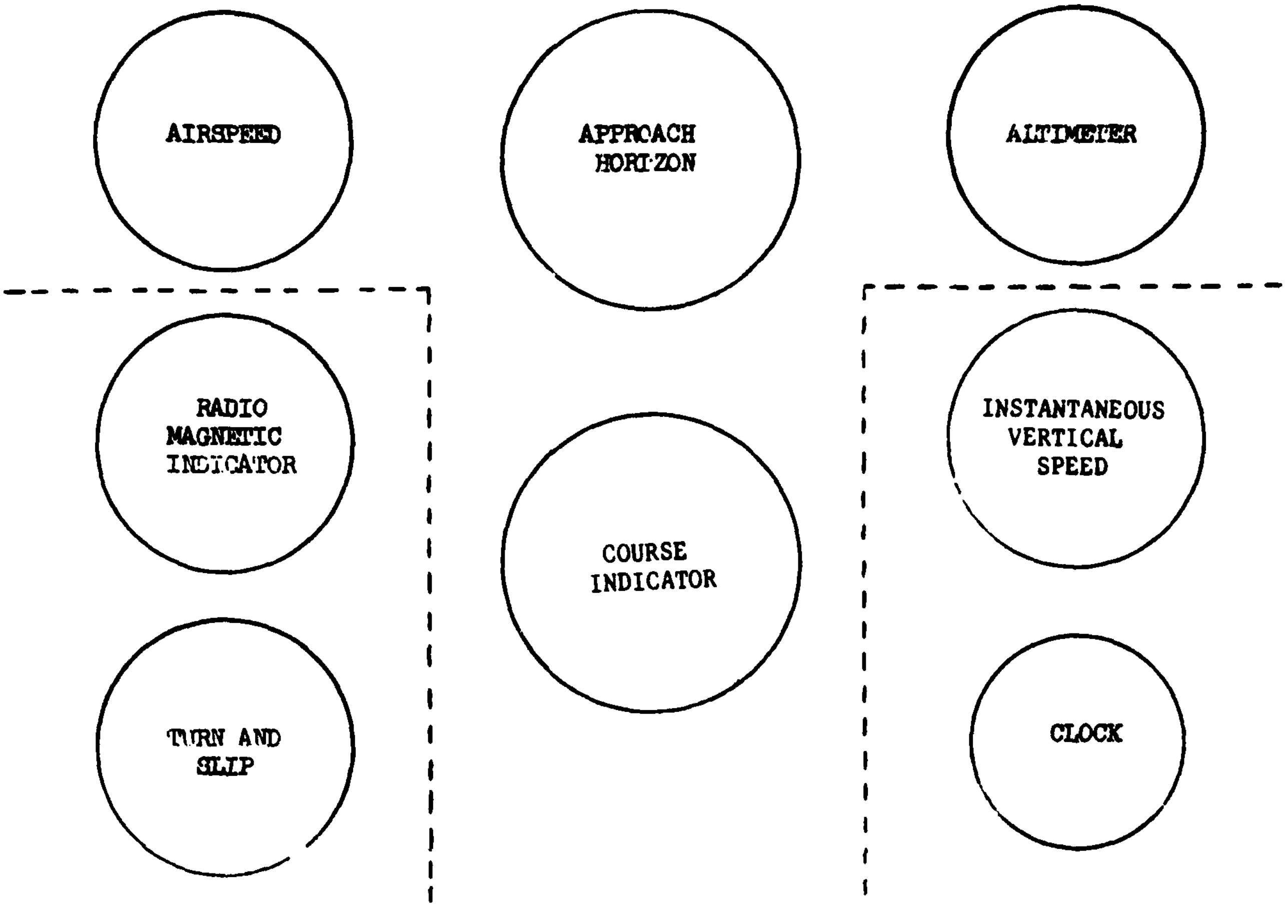

Optimum Panel Arrangement for Integrated Systems

(Dotted line indicates basic "T," not to be painted on panel

This drawing is taken from USAAVNTBD report of test, Project No. AVN 1557, 31 December 1958.

LIST OF REFERENCES

1. US Army Regulation 70-10.

2. US Army Regulation 750-6.

3. US Army Test and Evaluation Command Regulation No. 385-6.

4. US Army Test and Evaluation Command Regulation No. 705-2.

5. US Army Test and Evaluation Command Regulation No. 705-5.

6. US Army Test and Evaluation Command Regulation No. 705-7.

7. Message, Project TEAM Office, US Army Infantry Center, AJIMT-CM-12-972, subject: "Evaluation of Sioux Scout," 23 December 1963.

8. Military Standard MIL-STD-250B, "Cockpit Controls, Location and Actuation of, for Helicopters," 21 June 1962.

9. Manufacturer's Flight Manual, "Sioux Scout."

10. Plan of Test, USATECOM Project No. 4-4-6500-04, "Military Potential Test of the Sioux Scout Helicopter," 16 January 1964.